

WHAT IS CLAIMED IS:

1. A toner supply unit comprising:

a toner container that holds a toner, the toner container having a toner discharging portion for discharging  
5 the toner;

a toner container holder that detachably holds the toner container in such a manner that the toner discharging portion faces in a direction of gravity;

an insertion member that is inserted into the toner  
10 discharging portion while the toner container is held by the toner container holder, wherein toner is filled into the toner container through the insertion member; and

a preventing unit for preventing toner contamination due to toner leakage through the self-closing valve, the  
15 preventing unit including a self-closing valve, provided to the toner discharging portion, which is opened or closed by removing or inserting the insertion member from/into the toner discharging portion.

20 2. The toner supply unit according to claim 1, wherein the self-closing valve is a foamed elastic body having slits into which the insertion member is removed from or inserted into.

3. The toner supply unit according to claim 1, wherein the toner discharging portion is provided with a plurality of the self-closing valves, while at least one of the self-closing valves is made of foamed elastic body.

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4. The toner supply unit according to claim 1, wherein the preventing unit further includes a guide unit which matches the insertion member with a slit position in the self-closing valve while the toner container is held by the toner container holder.

5. The toner supply unit according to claim 4, wherein the guide unit includes a guide convex portion erected in the vicinity of the insertion member; and a guide concave portion, provided on the toner container, that engages with the guide convex portion.

6. The toner supply unit according to claim 5, wherein the height of the guide convex portion is larger than the height of the insertion member.

7. The toner supply unit according to claim 5, wherein shapes of the guide convex portion and the guide concave portion are changed depending on the type of toner that is to be stored in the toner container.

8. The toner supply unit according to claim 1, wherein the preventing unit is so constructed that the insertion member comprises an insertion portion to be inserted into the slits in the self-closing valve and a compression portion provided on side portions of the insertion portion for compressing the self-closing valve.

9. The toner supply unit according to claim 8, wherein the length of the insertion portion is smaller than a natural length of the self-closing valve and larger than its compressed length.

10. The toner supply unit according to claim 8, wherein an opening leading to a toner aisle in the insertion member is formed in the compression portion.

11. The toner supply unit according to claim 1, wherein the preventing unit is so constructed that the self-closing valve is made of the foamed elastic body is disposed with space in an insertion direction of the insertion member.

12. The toner supply unit according to claim 11, wherein a movable seal, which is moved by removing or inserting the insertion member, is provided in the space in the insertion member.

13. The toner supply unit according to claim 1, wherein the preventing unit includes a toner leakage preventing unit which the insertion member engages and when the toner container is loaded or unloaded, is movable in a vertical direction following the container.

14. The toner supply unit according to claim 13, wherein the toner leakage preventing unit is comprised of a seal made of foamed elastic body provided on a face opposing the toner container, a supporting frame for supporting the seal and an elastic unit for applying a pushing-up force to the supporting frame.

15. The toner supply unit according to claim 13, wherein the toner leakage preventing unit is held by the elastic unit at the highest position and pushed down from the highest position to the lowest position resisting an action of the elastic unit by the toner container held in by the toner container holder.

16. The toner supply unit according to claim 14, wherein the supporting frame is formed in a concave shape having a guide hole which the insertion member engages substantially in the center thereof while a seal is provided inside the concave formation.

17. The toner supply unit according to claim 16, wherein a jaw portion is formed on top of the supporting frame, so that when the toner container is removed from the toner container holder, the toner container is raised by the jaw  
5 portion.

18. The toner supply unit according to claim 1, wherein the preventing unit is comprised of an opening/closing valve, in which when the insertion member is removed, a valve body  
10 rests on a valve seat provided on the discharging portion and a self-closing valve made of foamed elastic body provided outside the opening/closing valve in the discharging portion.

15 19. The toner supply unit according to claim 18, wherein the opening/closing valve is provided with an elastic member which always urges the valve body in a direction that it rests on the valve seat.

20 20. The toner supply unit according to claim 19, wherein a coil spring is used as the elastic member.

21. The toner supply unit according to claim 18, wherein an elastic body is used for the valve seat.

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22. A toner supply unit comprising:

a toner container that holds a toner, the toner container having a toner discharging portion for discharging the toner;

5 a toner container holder that detachably holds the toner container in such a manner that the toner discharging portion faces in a direction of gravity;

an insertion member that is inserted into the toner discharging portion while the toner container is held by  
10 the toner container holder, wherein toner is filled into the toner container through the insertion member, the insertion member having a top surface and an opening on the top surface; and

a self-closing valve, provided to the toner  
15 discharging portion, which is opened or closed by removing or inserting the insertion member from/into the toner discharging portion.

23. The toner supply unit according to claim 22, wherein  
20 the opening leads to a toner supply aisle.

24. A toner supply unit comprising:

a toner container that holds a toner, the toner container having a toner discharging portion for discharging  
25 the toner;

a toner container holder that detachably holds the toner container in such a manner that the toner discharging portion faces in a direction of gravity;

an insertion member that is inserted into the toner  
5 discharging portion while the toner container is held by the toner container holder, wherein toner is filled into the toner container through the insertion member; and

a suction unit having an suction port in the vicinity of a toner discharging portion of the toner container held  
10 by the toner container holder.

25. The toner supply unit according to claim 24, wherein the suction unit is comprised of an air pump for feeding air into the toner container.

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26. An image forming apparatus comprising a toner supply unit, the toner supply unit including,

a toner container that holds a toner, the toner container having a toner discharging portion for discharging  
20 the toner;

a toner container holder that detachably holds the toner container in such a manner that the toner discharging portion faces in a direction opposite to the direction of gravity;

25 an insertion member that is inserted into the toner

discharging portion while the toner container is held by the toner container holder, wherein toner is filled into the toner container through the insertion member; and

a preventing unit for preventing toner contamination  
5 due to toner leakage through the self-closing valve, the preventing unit including a self-closing valve, provided to the toner discharging portion, which is opened or closed by removing or inserting the insertion member from/into the toner discharging portion.

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27. An image forming apparatus comprising a toner supply unit, the toner supply unit including,

a toner container that holds a toner, the toner container having a toner discharging portion for discharging  
15 the toner;

a toner container holder that detachably holds the toner container in such a manner that the toner discharging portion faces in a direction of gravity;

an insertion member that is inserted into the toner  
20 discharging portion while the toner container is held by the toner container holder, wherein toner is filled into the toner container through the insertion member, the insertion member having a top surface and an opening on the top surface; and

25 a self-closing valve, provided to the toner



discharging portion, which is opened or closed by removing or inserting the insertion member from/into the toner discharging portion.

5 28. An image forming apparatus comprising a toner supply unit, the toner supply unit including,

a toner container that holds a toner, the toner container having a toner discharging portion for discharging the toner;

10 a toner container holder that detachably holds the toner container in such a manner that the toner discharging portion faces in a direction of gravity;

an insertion member that is inserted into the toner discharging portion while the toner container is held by  
15 the toner container holder, wherein toner is filled into the toner container through the insertion member; and

a suction unit having a suction port in the vicinity of a toner discharging portion of the toner container held by the toner container holder.

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